

Luisa Fermo

Curriculum Vitae



General Information

Name,Surname Luisa Fermo
Nationality Italian
Date of birth October 23, 1981
Place of birth Potenza, Italy
Gender Female
Email fermo@unica.it
Home page <http://bugs.unica.it/~luisa/>

Education

Studies

25/03/2009 PhD in Mathematical Methods and Models for Dynamical Systems
University of Basilicata, Potenza
PhD. Dissertation: Weighted Polynomial Approximation and Numerical Treatment of Fredholm Integral Equations
Supervisor: Professor Giuseppe Mastroianni

21/04/2005 Master Degree in Mathematics
University of Basilicata, Potenza
Title of Thesis: Trattamento numerico di alcune classi di Equazioni Integrali su intervalli illimitati
Supervisor: Professor Giuseppe Mastroianni

Experience Abroad

17/09/2007-06/02/2008 Chemnitz University of Technology, Faculty of Mathematics (Germany)
Prof. Peter Junghanns

Summer School

25-29/09/2006 Summerschool on Applied Analysis (Chemnitz University of Technology, Faculty of Mathematics, Germany)
17-21/09/2007
22-26/09/2008

Languages

Italian Native
English ESOL International JETSET LEVEL 5 (B2)

Academic Positions

Current Position

30/11/2016 - present **Assistant Professor (Art. 24 c.3 Lett B Legge 240/10, tempo pieno) SSD: 01/A5 Numerical Analysis**

Affiliation University of Cagliari, Department of Mathematics and Computer Science
Viale Luigi Merello 92, 09123 Cagliari

Previous Positions

16/04/2012 - 29/11/2016 **Assistant Professor (Art. 24 c.3 Lett A Legge 240/10, tempo pieno) SSD: 01/A5 Numerical Analysis**

Affiliation University of Cagliari, Department of Mathematics and Computer Science
Viale Luigi Merello 92, 09123 Cagliari

1/10/2011-15/04/2012 **Research Fellow**

Research Project "Mathematical Models, Qualitative Analysis and Scientific Computing for Multiscale Complex Biological Phenomena under the action of the immune competition" within the European Project "FP7-HEALTH-2007-A RESOLVE HEALTH-2008-20.20.47 Termination of development processes and their reactivation in adult life"

Affiliation Politecnico di Torino, Department of Mathematics
Corso Duca degli abruzzi 24, 10129 Torino

01/07/2010 - 30/09/2011 **Research Fellow**

Research Project "Mathematical Models, Qualitative Analysis and Scientific Computing for Wound Healing and Fibrosis under the action of the immune competition" within the European Project "FP7-HEALTH-2007-A RESOLVE HEALTH-2008-20.20.47 Termination of development processes and their reactivation in adult life"

Affiliation Politecnico di Torino, Department of Mathematics
Corso Duca degli abruzzi 24, 10129 Torino

08/01/2009 - 30/06/2010 **Research Fellow**

Research Project "Trattamento numerico di equazioni integrali con nuclei fortemente oscillanti su intervalli limitati e non"

Affiliation University of Basilicata, Department of Mathematics and Computer Sciences
Viale dell'Ateneo Lucano 10, 85100 Potenza

Qualifications

2017 National Scientific Qualification (ASN - Abilitazione Scientifica Professionale) as Associate Professor of Numerical Analysis

Validity 28th November 2017 through 28th November 2023

Scientific Activity

Research Interests

1. Numerical solution of integral equations
2. Numerical solution of nonlinear evolution models of integrable type
3. Inverse problems applied to geophysics
4. Mathematical methods and models for the vehicular traffic
5. Polynomial approximation in Hilbert spaces with weighted metric
6. Functional properties of positive operators

Projects

- 2018 Biannual Research Project Fondazione di Sardegna e RAS, "Algorithms for Approximation with Applications". Grant: 28k€. Role: principal investigator.
- 2018 Annual Project INdAM-GNCS 2018 "Metodi, algoritmi e applicazioni dell'approssimazione multivariata". Role: participant.
- 2017 National Grant for Fundamental Research (FFABR). Grant: 3k€.
- 2017 Annual Project INdAM-GNCS 2017 "Metodi numerici non lineari per problemi inversi e applicazioni". Role: participant.
- 2017 "Innovative methods for Volterra integral equations" Borsa di studio INdAM, 3 months. Host institution: Instituto Superior Técnico - University of Lisbon. Role: principal investigator.
- 2016 Annual Project INdAM-GNCS 2016 "Inverse problem in geophysics". Role: participant.
- 2010-2012 European Project "RESOLVE". Role: fellowship.

Organization of schools

1. "Summer School on Inverse Problems in Cagliari ", 17-21 July 2017, Cagliari
2. "Second Advanced School on Integral Equations and Applications", 18-20 May 2017, Lisbon

Organization of conferences

1. "International Workshop on Analysis and Numerical Approximation of Singular Problems", 4-6 September 2018 Cagliari
2. "Opening Meeting for the research project GNCS 2016, PING - Inverse problem in geophysics", 6 April 2016 Florence
3. "Due giornate di Matematica Applicata", 16-17 October 2012 Cagliari

Scientific Communications

Invited talk

- 13-16/09/2016 XIII SIMAI Biannual Congress, Minisymposia "Applications and Numerical Methods for Integral Equations", Milano. Lecture on "A new numerical method for mixed boundary value problems on domains with corners".

- 08-13/09/2016 4th Dolomites Workshop on Constructive Approximation and Applications, Session on "Numerical integration, integral equations and transforms", Alba di Canazei. Lecture on "A numerical method for a Volterra integral equation related to the initial value problem for the KdV equation".
- 22-24/10/2015 Fifth International Workshop on Analysis and Numerical Approximation of Singular Problems, Lagos (Portugal). Lecture on "A Nyström method for mixed boundary value problems on domains with corners".
- 17-20/09/2014 International Conference on Numerical Analysis and Approximation Theory, Cluj-Napoca (Romania). Lecture on "Matrix-pencil method for estimating parameters of monomial-exponential sums".

Conferences

- 2-6/07/2018 Congresso Nazionale SIMAI 2018, Roma. Lecture on "Recovering the electrical conductivity of the soil via linear integral equations."
- 8-9/02/2018 Due giorni di algebra lineare numerica e Applicazioni, Padova. Lecture on "A numerical method for bisingular Cauchy integral equations."
- 16-17/02/2017 Due giorni di algebra lineare numerica, Como. Lecture on "Numerical methods for Volterra integral equations basic to the solution of the KdV equation."
- 01-04/06/2016 21st International Conference Mathematical Modelling and Analysis, Tartu (Estonia). Lecture on "A numerical method for mixed boundary value problems on domains with corners".
- 06/04/2016 Opening Meeting for the research project Inverse problem in Geophysics, Florence. Lecture on "Identifying a sphere via exponential sums".
- 22/09/2015 Tyrrehnian International Workshop on Digital Communications, Florence. Lecture on "Numerical solution of the direct scattering problem for the nonlinear Schrödinger equation".
- 18-21/06/2015 New Trends in Numerical Analysis: Theory, Methods, Algorithms and Applications, Falerna (Italy). Lecture on "Bound states computation for the nonlinear Schrödinger equation".
- 24-31/05/2015 International Conference on Nonlinear Evolution Equations and Dynamical Systems, Santa Margherita di Pula (Italy). Lecture on "Scattering data computation for the Zakharov-Shabat system".
- 09-10/04/2015 Two days on Applied Mathematics in Cagliari, Cagliari. Lecture on "A numerical method for estimating parameters of monomial-exponential sums".
- 07-10/07/2014 Congresso Nazionale SIMAI 2014, Taormina (Italy). Lecture on "A kinetic approach to traffic flow on road networks".
- 24-25/10/2013 Safety, panic, traffic and crowd dynamics, Bologna. Lecture on "A kinetic model for modeling vehicular traffic along one way roads.
- 12-13/09/2013 International Workshop on Approximation Theory and Applications, Rifreddo (Italy). Poster on "A matrix-pencil method for recovering monomial-exponential sums".
- 02-05/09/2013 VDM60 - Nonlinear Evolution Equations and Linear Algebra, Cagliari. Lecture on "Computation of relevant scattering data in the Zakharov Shabat system".
- 11-12/02/2013 Incontro PRIN, Catania. Lecture on "A fully-discrete-state kinetic theory approach to modeling vehicular traffic".

- 16-17/10/2012 Workshop “ Due Giornate di Matematica Applicata”, Cagliari. Lecture on “Risoluzione numerica dell'equazione non lineare di Schrödinger”.
- 25-28/06/2012 Workshop “ Congresso Nazionale SIMAI 2012”, Torino. Lecture on “A discrete kinetic theory approach to modeling vehicular traffic”.
- 16-17/02/2012 Workshop “ Due Giorni di Algebra Lineare Numerica”, Genova. Lecture on “Un metodo numerico per il problema di Dirichlet su domini con frontiera a tratti regolari”.
- 29-30/10/2009 Workshop “ Integral Equations: recent numerical developments and new applications”, Parma. Lecture on “On a regularizing parameter of some integral equations”.
- 5-10/10/2009 Workshop on Advances and Trends in Integral Equations, Chemnitz (Germany). Lecture on “A discussion on the regularizing parameter of some integral equations”.
- 24-30/09/2009 6th International Conference on Functional Analysis and Approximation Theory, Acquafredda di Maratea (Italy). Lecture on “ The Shepard operator on the real semiaxis”.
- 23/04/2009 Workshop del Dottorato di Ricerca Internazionale in Matematica “ János Bolyai”, Potenza. Lecture on “Un metodo di Nyström per le Equazioni di Fredholm con nucleo e/o termine noto singolare”.
- 25-29/08/2008 International Conference Approximation and Computation, Nis (Serbia). Lecture on “A Nyström type method for Integral Equations”.
- 06-12/07/2007 Conference on Approximation Theory, Budapest. Lecture on “On a positive linear operator”.
- 07-11/11/2007 VIII International Meeting on Approximation Theory of the University of Jaén, Ubeda (Spain). Lecture on “Some embedding theorems”.
- 27-28/09/2007 Equazioni integrali: recenti sviluppi numerici e nuove applicazioni, Parma. Lecture on “Equazioni integrali con nucleo e/o termine noto singolari”.

Visits

- 8-9/10/2010 Scientific visit at Medical University of Vienna (Doctor David Lumenta)
- 8-9/11/2010 Resolve European Project Meeting, Vienna
- 27-28/03/2012
- 19-23/11/2011, CNR-IAC “Mauro Picone”, Rome (Prof. Andrea Tosin)
- 16-20/07/2012
- 27/1-2/2/2013, Politecnico di Torino (Prof. Nicola Bellomo)
- 2-7/2/2014
- 18-23/06/2018 Scientific visit at Instituto Superior Tecnico (Prof. Teresa Diogo and Pedro Lima)

Referee Activity

- Referee for Applied Mathematics and Computation • Applied Numerical Mathematics • Computers and Mathematics with Applications • Mathematical Models and Methods in Applied Sciences • Mathematics and Computer in Simulations •

Participation National Groups

- 2017-present Member of Research Italian network on Approximation (RITA)
- 2014-present Member of INdAM-GNCS (National Group for Scientific Computing of the National Institute for Advanced Mathematics, Italy)

- 2011-present Member of SIMAI (Società Italiana di Matematica Applicata e Industriale) and member of "SIMAI Activity Group on Numerical Modeling and Scientific Computing" and "SIMAI Activity Group on Complex Systems"
- 2011-2013 Member of INdAM-GNFM (National Group for Mathematical Physics of the National Institute for Advanced Mathematics, Italy)
- 2008-2010 Member of INdAM-GNCS (National Group for Scientific Computing of the National Institute for Advanced Mathematics, Italy)

Theses Direction Experience

- 2013/2014-2016/2017 Patrizia Diaz de Alba, **PhD Student** (co-supervised with Giuseppe Rodriguez). Thesis: Numerical treatment for inverse problems in applied Geophysics.
- 2014/2015 Alessio Pani, **BSc Electronic and Electronical Engineering** (co-supervised with Giuseppe Rodriguez). Thesis: "Identificazione dei parametri elettromagnetici di un ordigno inesploso sepolto".

Boards

- 17/07/2018 Member of the PhD thesis committee of Giancarlo Nino (GSSI, L'Aquila). Thesis: Laplace Transform methods based on pseudospectral roaming for convection-diffusion equations (advisor: prof. Nicola Guglielmi, GSSI; co-advisor Lopez-Fernandez Maria, GSSI)

Decreto di nomina http://bugs.unica.it/~luisa/pdf/DR_105_2108

Teaching

Holder of PhD Course

- 2015-present **Applicable Approximation Theory** - 20 hours - (University of Cagliari, Italy)

Holder of BSc Courses, MSc Courses and Master Course

- 2018-present **Calcolo Scientifico e Metodi Numerici** - 48 hours - (Bachelor's degree, Computer Science, University of Cagliari, Cagliari, Italy)
- 2012 - present **Matematica Applicata** - 60 hours - (Bachelor's degree, Biomedical Engineering, University of Cagliari, Cagliari, Italy)
- 2015-present **Metodi numerici della teoria dell'approssimazione** - reading course - (Bachelor's degree and Master's degree, Mathematics, University of Cagliari, Cagliari, Italy)
- 2016 - 2018 **Matematica Applicata** - 60 hours - (Bachelor's degree, Chemical and Mechanical Engineering, University of Cagliari, Cagliari, Italy)
- 2011-2012 **Sistemi Complessi** - 12 hours - (Second Level Master, Politecnico di Torino, Torino, Italy)

Teaching assistant of BSc Courses, MSc Courses

- 2011-2012 **Calcolo Numerico** - 40 hours - (Bachelor's degree, Politecnico di Torino, Torino)
- Equazioni della Fisica Matematica** - 12 hours - (Bachelor's degree, Mathematical Engineering, Politecnico di Torino, Torino, Italy)
- Istituzioni di Matematica** - 11 hours - (Bachelor's degree, Architecture, Politecnico di Torino, Torino, Italy)

- 2010-2011 **Equazioni della Fisica Matematica** - 20 hours - (Master course, Mathematical Engineering, Politecnico di Torino, Torino, Italy)
Fisica Matematica - 4 hours - (Bachelor's degree, Informatic Engineering, Politecnico di Torino, Torino, Italy)

Thematic Seminar Cycles

- 2016-2017 **Research Seminar on Numerical Analysis**, Instituto Superior Técnico - University of Lisbon, Portugal
 Seminar on "A numerical approach for partial differential equations of integrable type" (26/04/2017)
- 2016-2017 **Research Seminar on Numerical Analysis**, University of Coimbra, Portugal
 Seminar on "Volterra integral equations for partial differential equations of integrable type" (7/04/2017)
- 2013-2014 **Advanced Seminar on Applied Mathematics** (PhD Course), University of Cagliari, Italy
 Series of 2 seminars on "Quadrature formula and integral equations"(03-04/04/2014)
- 2012-2013 **Seminar on Mathematics**, University of Cagliari, Italy
 Seminar on "A mathematical model for the vehicular traffic" (27/11/2012)
- 2011-2012 **Complex systems in Engineering Sciences** (PhD Course), Politecnico di Torino, Italy
 Seminar on "A kinetic mathematical model for vehicular traffic" (27/11/2011)
- 2008-2009 **Research Seminar on Numerical Analysis**, University of Basilicata, Italy
 Series of 4 seminars on "Embedding Theorems in Weighted Functional Spaces"(9/03/2009), "Numerical Treatment of Fredholm Integral Equations with singular given functions" (12/03/2009), "The Fourier transform applied to Carleman's equation" (11/06/2009), "On some positive operators" (18/06/2009)
- 2006-2007 **Seminar on Nonlinear Functional Analysis** (PhD Course), Chemnitz University of Technology, Germany
 Series of 2 seminars on "The surjective implicit function theorem and the rank theorem" (8/01/2008) and "The Sard-Smale Theorem " (15/01/2008)
Research Seminar Analysis (PhD Course), Chemnitz University of Technology, Germany
 Seminar on "Numerical Treatment of Fredholm integral equations with singular right-hand side and/or kernels" (27/11/2007)
Research Seminar on Numerical Analysis, University of Basilicata, Italy
 Series of 2 seminars on "The Jackson theorem on the real axis"(18/10/2007) and "The Fredholm method for the Dirichlet problem" (11/09/2007)
- 2005-2006 **Research Seminar on Numerical Analysis**, University of Basilicata, Italy
 Series of 2 seminars on "The Fourier sums" (19/09/2006) and "The Marcinkiewicz inequalities and their applications" (18/10/2006)

Publications

Papers

- [1] L. Fermo, C. Van der Mee, and S. Seatzu, "Scattering data computation for the Zakharov-Shabat system with nonsmooth potentials," *Applied Numerical Mathematics*, vol. 116, pp. 195–203, 2017.
- [2] L. Fermo, C. Van der Mee, and S. Seatzu, "Scattering data computation for the Zakharov-Shabat system," *Calcolo*, vol. 53, pp. 487–520, 2016.
- [3] L. Fermo, C. Van der Mee, and S. Seatzu, "Parameter estimation of monomial-exponential sums in one and two variables," *Applied Mathematics and Computation*, vol. 258, pp. 576–586, 2015.
- [4] L. Fermo and C. Laurita, "On the numerical solution of a boundary integral equation for the exterior Neumann problem on domains with corners," *Applied Numerical Mathematics*, vol. 94, pp. 179–200, 2015.
- [5] L. Fermo and A. Tosin, "A fully-discrete-state kinetic theory approach to traffic flow on road networks," *Mathematical Models and Methods in Applied Sciences*, vol. 25(3), pp. 423–461, 2015.
- [6] L. Fermo and C. Laurita, "A Nyström method for the numerical solution of a boundary integral equation related to the Dirichlet problem on domains with corners," *Numerische Mathematik*, vol. 130(1), pp. 35–71, 2015.
- [7] L. Fermo, C. Van der Mee, and S. Seatzu, "Parameter estimation of monomial-exponential sums," *Electronic Transactions on Numerical Analysis (ETNA)*, vol. 41, pp. 249–261, 2014.
- [8] L. Fermo, C. Van der Mee, and S. Seatzu, "Emerging problems in approximation theory for the numerical solution of the nonlinear Schrödinger equation," *Publication de l'Institut Mathématique*, vol. 96, pp. 125–141, 2014.
- [9] L. Fermo and A. Tosin, "Fundamental diagrams for kinetic equations of traffic flow," *Discrete and Continuous Dynamical Systems Series S*, vol. 7(3), pp. 449–462, 2014.
- [10] L. Fermo and A. Tosin, "A fully-discrete-state kinetic theory approach to modeling vehicular traffic," *SIAM, Journal on Applied Mathematics*, vol. 73, pp. 1533–1556, 2013.
- [11] N. Bellomo, A. Carloni, V. Poletti, L. Fermo, and M. Chilosi, "Heterogeneous distribution of mechanical stress in human lung: a mathematical approach to evaluate abnormal remodeling in IPF," *Journal of Theoretical Biology*, vol. 332, pp. 136–140, 2013.
- [12] A. Bellouquid, E. De Angelis, and L. Fermo, "Towards the modeling of vehicular traffic as a complex system: a kinetic approach," *Mathematical Models and Methods in Applied Sciences*, vol. 22, p. 1140003, 2012.
- [13] L. Arlotti, E. De Angelis, L. Fermo, M. Lachowicz, and N. Bellomo, "On a class of integro-differential equations modeling complex systems with nonlinear interactions," *Applied Mathematics Letters*, vol. 25, pp. 490–495, 2012.
- [14] V. Coscia, L. Fermo, and N. Bellomo, "On the mathematical theory of living systems ii: The interplay between mathematics and system biology," *Computer and Mathematics with Applications*, vol. 62, pp. 3902–3911, 2011.
- [15] L. Fermo, N. Bellomo, and D. Lumenta, "Assessment of surgical strategies for addressing keloids: an optimization problem," *Computer and Mathematics with Applications*, vol. 62, pp. 2417–2423, 2011.
- [16] C. Bianca and L. Fermo, "Bifurcation diagrams for the moments of a kinetic type model of keloid-immune system competition," *Computer and Mathematics with Applications*, vol. 61, pp. 277–288, 2011.

- [17] L. Fermo, "A quadrature method for Cauchy Singular integral equations with singular given functions," *Rivista di Matematica della Università di Parma*, vol. 2, pp. 99–123, 2011.
- [18] L. Fermo, "A regularizing parameter for some fredholm integral equations," *Computational Methods in Applied Mathematics*, vol. 10, pp. 177–194, 2010.
- [19] L. Fermo, "Weighted convergence of some positive linear operators on the real semiaxis," *Studia Univers. "Babes-Bolyai", Mathematica*, vol. LV, pp. 219–242, 2010.
- [20] L. Fermo and M. G. Russo, "Numerical Methods for Fredholm integral equations with singular right-hand sides," *Advances in Computational Mathematics*, vol. 33, pp. 305–330, 2010.
- [21] L. Fermo and M. G. Russo, "A Nyström method for Fredholm integral equations with right-hand sides having isolated singularities," *Calcolo*, vol. 46, pp. 61–93, 2009.
- [22] L. Fermo, "A Nyström method for a Class of Fredholm integral equations of the third kind on unbounded domains," *Applied Numerical Mathematics*, vol. 59, pp. 2970–2989, 2009.
- [23] L. Fermo, "Embedding Theorems for functions with inner singularities," *Acta Scientiarum Mathematicarum (Szeged)*, vol. 75, pp. 547–573, 2009.

Proceedings

- [1] L. Fermo, C. Van der Mee, and S. Seatzu, "Numerical solution of the direct scattering problem for the nonlinear Schrödinger equation," *IEEE Xplore Tyrrhenian International Workshop on Digital Communications*, pp. 6–9, 2015.
- [2] L. Fermo, "On a positive linear operator on the semiaxis," *Rendiconti del Circolo Matematico di Palermo*, vol. Serie II Suppl. 82, pp. 315–343, 2010.

Submitted

- [1] L. Fermo, C. Van der Mee, and S. Seatzu, "A numerical method for volterra integral equations basic to the solution of the korteweg-de vries equation."

July 21, 2018

In fede

Luisa Fermo